

SFI's Computational Ventures



The National Foundation for Excellence in Scientific Research

Overview

- **Who am I ?**
- **History and Background**
- **Where the ICT funding has gone**
- **Examples of key projects**
- **High-end computing**
- **Wider collaborations ?**

Who is Mark Keane ?

- Director of ICT in SFI
 - Responsible for €200M research spend
 - Responsible for planning of future research agenda
- Chair of Computer Science, UCD
 - Build up Dept from 1998-2003
 - Ranked top in SFI/Forfas Baseline
- Pre-History
 - TCD Computer Science (1990-1998)
 - Open University, Cardiff University, Queen Mary College
 - BA (UCD), PhD (TCD) in Psychology ?

Science Foundation Ireland: *A Brief History of SFI*



- **Technology Foresight Report – April 1999**
- **Focus on ICT and Biotechnology**
- **SFI launched – July 2000**
€646M from Dept of Enterprise, Trade & Employment
- **Director General appointed September 2001**
- **SFI becomes statutory body, summer 2003**



Government Strategy: ***The Celtic Tiger in R&D?***

- **Move Ireland up value chain: R&D driven economy**
- **Attract, Grow R&D activities within Ireland**
- **Broaden the activities of MNCs within Ireland**
- **Be supportive of indigenous SMEs, start-ups**

SFI's key role is:

- **Build research excellence and human capital**
- **Foster academic-industry collaboration**

SFI Actions to build & brand Irish R&D



- **Invest in best people & best ideas**
 - SFI Investigator Award ~ €1M (4 years)
- **Import leading scientists**
 - SFI Fellow Awards & Research Professorships ~€5M (5 years)
- **Create centres of critical mass**
 - Centres for Science, Engineering & Technology (CSET) ~ €25M (5 years)
- **Establish International Partnerships**
 - Walton Visitor Award; Conferences & Workshops
- **Campus-Industry Partnerships**
 - CSETs
 - Industry Research Partnership Supplements ~€50k /year
 - And ALL SFI programs

Peer review:

Feedback, quality control, branding

Strategic review:

Pathway to exploitation, value to *Ireland*

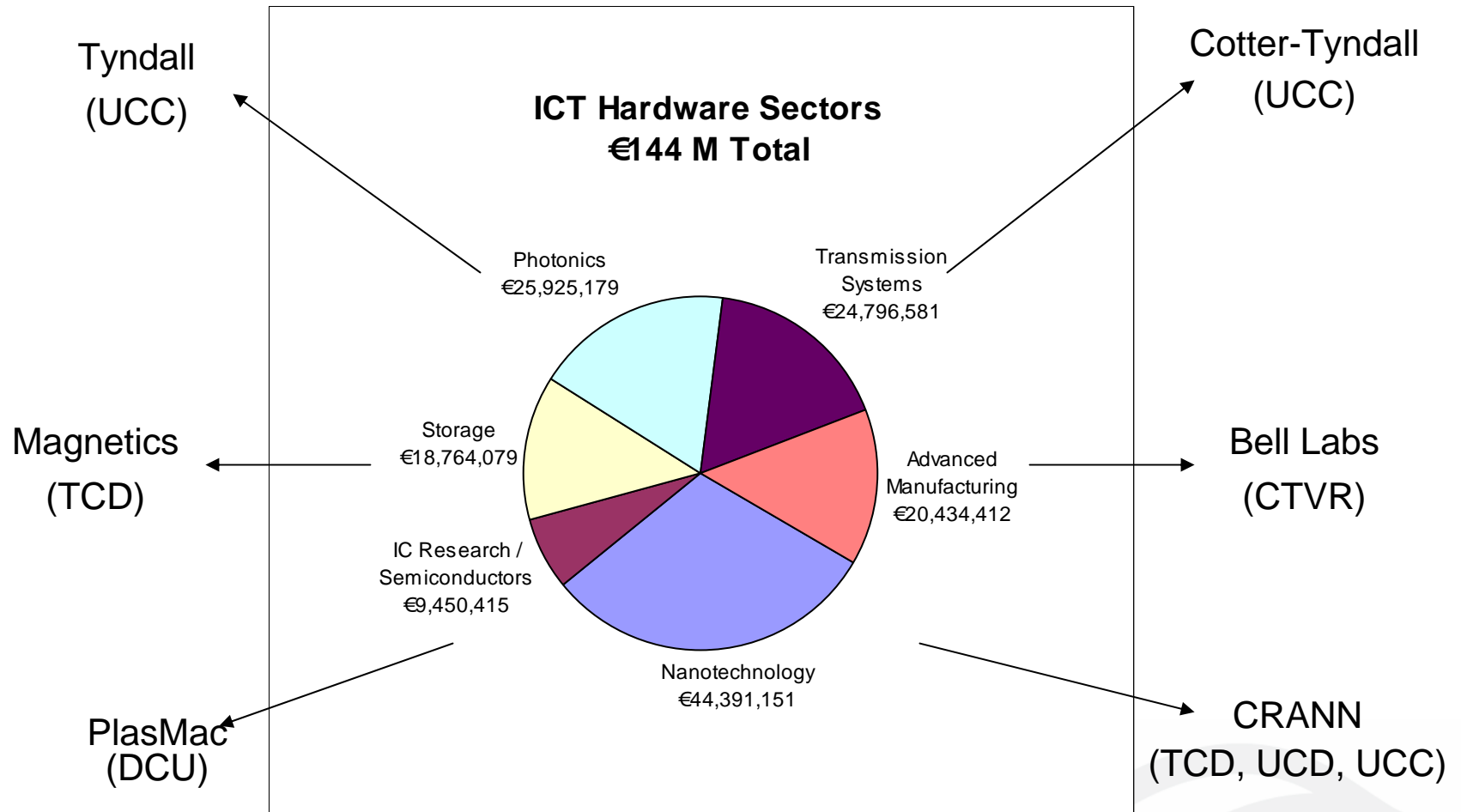
CSETs - Centres for Science, Engineering, & Technology



- **SFI funding:** up to €25 M (€5m/yr), over 5 yrs, renewable
- **True centre:** whole greater than sum of parts, synergy...
- **Partnerships with industry:** 20% cost share (particularly people)
Real intellectual partnerships
- **Strategically important to Ireland Inc.:** advancing BioT and ICT
- **Research excellence:** potential to be best in world – “edge”
- **Outstanding Director**
- **Important Education & Outreach component**



ICT Hardware



ICT Software

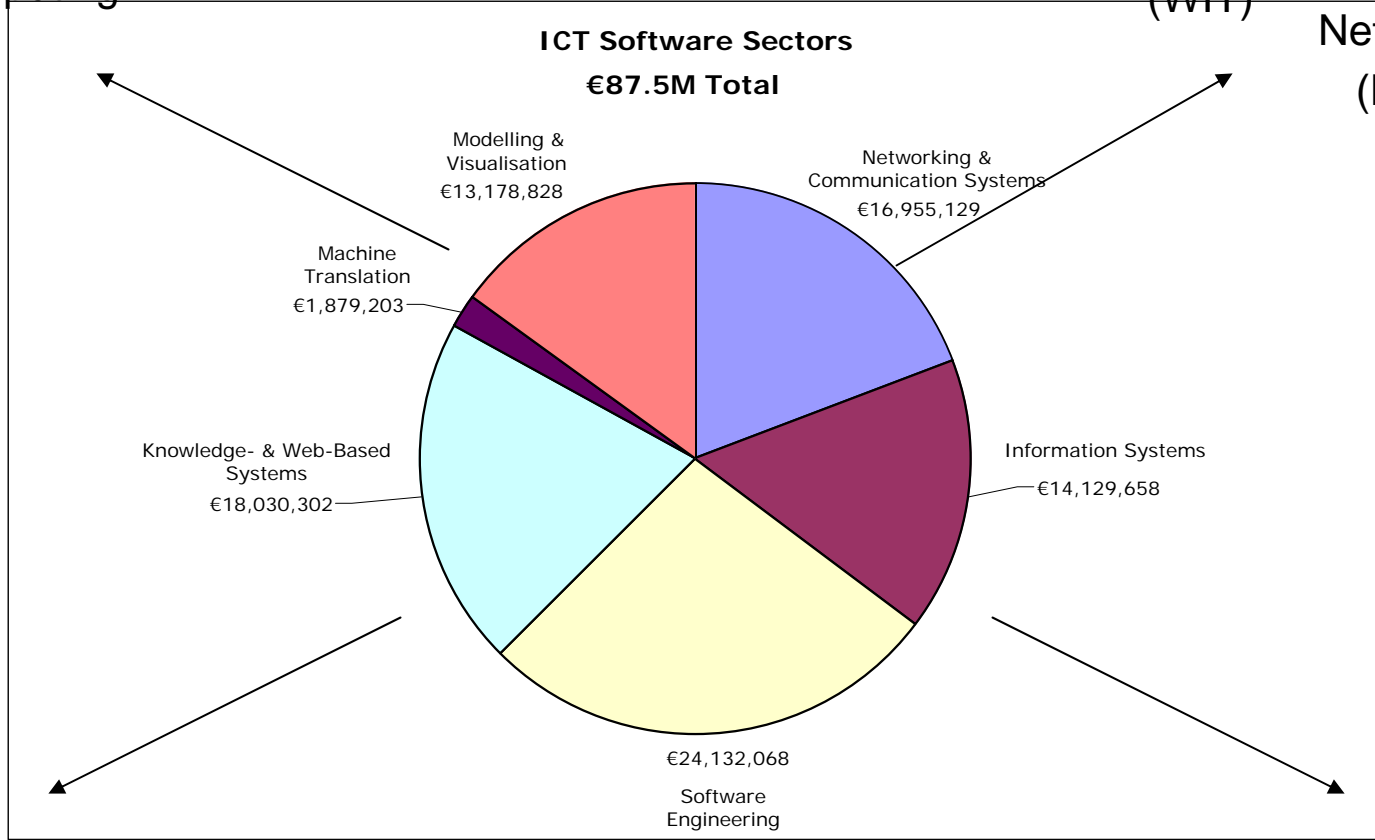


High-End Computing

Autonomic Networking (WIT)

Networking (NUIM)

ICT Software Sectors
€87.5M Total

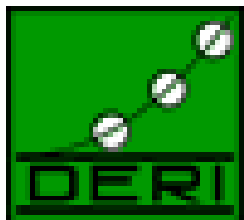


DERI (NUIG)

AIC (UCD, DCU)

ISERC (UL, DCU, TCD)

ICT Centres (2003 & 2004)



Digital Enterprise Research Institute

Director: Dieter Fensel

Web: www.deri.ie



Centre for Research on Adaptive Nanostructures & Nanodevices

Director: John Pethica

Web: www.crann.tcd.ie



Centre for Telecommunications Value-Chain-Driven Research

Director: Donal O'Mahony

Web: ctvr.tcd.ie

Lucent Technologies
Bell Labs Innovations



High End Computing Initiative

- PRTL, SFI and others had funded clusters, supercomputers in diverse groups
- One for everyone in the audience in the back yard
- This was not optimal (Dongarra)
- Several failed attempts to coalesce
- SFI wanted to speed evolution

Focused call for “A” proposal

- Constrained call after consultation
- Expected one proposal if successful
- Two submitted and internationally reviewed
- One project clearly best
- NUI Galway led (with TCD, UCD, DIAS, NUIM, UCC, Tyndall)
- €2m for one year

HEC Proposal

- Funding of €2M, 1-Year Commitment
- Minimal follow on for 2 years (€0.8M)
- Facility remote from groups (Citywest?)
- Brief to be inclusive, to be National
- End of Year Review
- Future funding?
- Could be up to €18M over 5 years

National Centre for High-End Computing



- Science Foundation Ireland call for a National HEC Centre
- Combined with HEA projects IITAC and CosmoGrid (€2.5M)
 - €2M from SFI in first year
 - Large cluster 1000+ processors
 - SMP machine (128+) processors + 256 GB memory
 - Storage, 100TB
 - Systems and support staff
 - Systems in place by September 2005
 - Budget to 2010
 - 2007/8 hardware upgrade
 - Centre staff 40+ over 6 institutions
- www.hec.ie



2005 - SFI + HEA

National HEC

Centre

DIAS



UCD



UCC

TCD



a new foundation for science



How can IT services do ?

- Computing services support for research is hard
 - Community is diverse
 - Researchers to stick to their own agendas
- What can you provide ?
 - High-end storage, supercomputers, grids
 - Specialized networks and rings
- But, should it be local ?

Looking beyond your area

- Could we think nationally?
 - Are there economies in joint action
 - Reduce duplication of scarce expertise
- Could we leverage current investments?
 - Use the SFI HEC initiative ?
 - Bring in other interests (EI, IDA)
- Could we go even further ?
 - Leverage research base in networks etc
 - Develop a showcase computational facility

www.sfi.ie

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SFI email alerts are concise, text-based emails that give you the latest SFI information and links, such as when a new Call For Proposals is made or an SFI press release is issued.

To subscribe simply email alerts@sfi.ie with 'subscribe' in the subject line

Evolution of HPC Nationally funded projects in Ireland



CSI (TCD, QUB) -----

PRTL1

NUI,G - Biomedical and Engineering Science

TCD - Building plus research (IITAC)

CSI + NUI, G

PRTL3

TCD IITAC

NUI, G - Marine

CosmoGrid (DIAS,UCD,NUIG)

CSI+DIAS

SFI HEC Centre

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Evolution of Grid projects Ireland

EI Strategic Grant

TCD, UCC & NUI, Galway - Grid Ireland

HEA - PRTL3

DIAS & UCD - CosmoGrid

Galway - Marine Grid

rest of CosmoGrid

Genegrid

EU

EGEE

JetSet

SFI

WebCom-G

HEC Centre



1999 2000 2001 2002 2003 2004

Picture 2002 - PRTL13



UCD



DIAS



UCC



TCD



Current HPC Resources in Ireland



- Galway - HPC Centre
 - www.scg.nuigalway.ie
 - 40 proc. Origin 3800 - 40GB and 2TB storage
 - 32 node (dual 2.4GHz Xeon) Dell Poweredge 1750 cluster
 - 20 processor, 20 1.8GHz Altix 3700
 - >9TB Storage, mix Dell Powervault and SGI TP9000
- TCD
 - www.tchpc.tcd.ie
 - IITAC cluster 64 PIII 1GHz 1.3TB
 - 130 processor Xeon 3.1GHz
 - 4TB IBM FAStT 700 storage
 - Visualisation - 2005

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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Current HPC Resources - II

- Cork - Boole Centre
 - 100 processor Dell Blade server 1.8Hz Xeon
- DIAS
 - 32 processor 2.4GHz Xeon cluster
- Tyndall National Institute (NMRC) Cork
 - Several 64 processor clusters
- UCD
 - 220 processor CosmoGrid cluster
 - 3.5TB Disk farm (part of WebCom-G project)

Ireland as whole < 1000 processors installed cluster capacity < 1Tflop, this is roughly the same as the University of Toronto. But the capacity is distributed with wide latencies - consequently there are large science areas we can not properly address.

Current HPC Resources - III - Grid



- Grid-Ireland
 - All Ireland strategic grid project
 - Certification
 - EU links (DataGrid, EGEE)
 - Partner to CosmoGrid, MarineGrid and National HEC.
 - Connectivity to all Universities
 - 11 Institutes of Technology through light gateways



Cosmogrid

Grid Enabled Computational Physics of Natural Phenomena



- PRTL3 programme
 - Nine institutions
 - 60 researchers
 - €12M funding
- Training courses
 - Parallel programming
 - Grid technology
 - Visualisation
- Aim to deliver science through Grid and HPC
 - 3 core institutions
 - DIAS
 - NUI, Galway
 - UCD

